

Ethiopian Meat and Dairy Industry Development Institute

Feasibility Study for the establishment of Honey & Beeswax Processing Investment



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Bishoftu-Ethiopia

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1. Executive Summary

Ethiopia has huge investment potentials for honey bee industry subsector, and the climatic condition is favorable for growing different vegetation and crops which are an excellent source of nectar and pollen that are favor of beekeeping industries. Mass watershed development along all over the country and organic forest coffee development at the southern and western part of the country have great opportunities to promote honey bee industry and to boost bee hive products.

Ethiopia has an estimated of 10 million honeybee colonies, out of which about 5 million are expected to be hived while the remaining exist in the forest (CSA 2009). Beekeeping is an important activity for many rural people and is also carried out in homesteads of all parts of the country. It is the most widely spread practice in the farming communities and is a traditionally significant off-farming activity for an estimated 1.7 million rural households (MoARD, 2007).

Have a production potential of 500,000 ton of honey and 50,000 ton of beeswax annually and currently produce around 23.6% and 2.1% of the total African and world's honey, respectively (FAO; 2014).

Honey bee industry is an environmentally sound, technically and financially feasible, economically viable, socially acceptable economically activities that employ about 2 million people and estimated average of 5 million bee colonies confined in hives (CSA 2009).

According to CSA, 2001 the major honey and beeswax production by regional share is Oromia (about 41%), S.N.N.P.R (22%), Amara (21%) and Tigray (5%).

Currently, there is about 16 of honey and ten beeswax processing and exporter companies are actively involved in the business. In 2015 budget year about 675 ton of honey and 520 ton of beeswax exported to the foreign market and earned a total of 2.31 and 4.75 American dollars respectively.

Globally there is a large and growing demand for Ethiopian good quality honey beeswax and other bee products. Currently, Ethiopia entered in EU market in honey and wax, the organic honey has a high demand in developed countries, and there will also be a more alternative market outlets.

It is a great opportunity for market demand projection that Ethiopia is exhaustively working to be the member of world Trade Organization (WTO).

2.Purpose of this Document and Considered factors for success

2.1 Purpose

The goal of this paper is to facilitate potential investors in Honey Production, Processing, and Packaging& Marketing business by providing them overview of the firm with the hope that such information as provided herein will help the potential investors in crucial investment decisions.

The honey industry has to be considered the farming of honeybees, harvesting, and processing of honey followed by packaging and then distribution or supply to the consumer market.

2.2 Considered factors for success

Individuals considering entering the honey industry must carefully consider the following factors:

- Networking with the honey suppliers (unions, cooperatives, individual beekeepers & others) from all over the country would be necessary to meet any surplus requirement
- Collect Consistent quality of honey from listed or registered suppliers
- Availability of skilled manpower through the value chain
- Looking for and networking with better price market destination countries
- Build the technical capacity of beekeepers and technology supply (improved beekeeping equipment's, packaging materials--) to producers and processors as well.
- Awareness creation on importance and impact of producing quality and safety honey
- To guide and governed by honey and beeswax national strategic plan and other related rules and regulation.

3. Product Description

According to the Quality and Standard Authority of Ethiopia (QSAE), honey is determined as the natural sweet substance produced by honeybees from the nectar of blossoms which honey bees collect, transform and combine with specific matter of their store and leave in the honeycomb to ripen and mature.

Honey consists essentially of different sugars, predominantly glucose and fructose. Honey also contains protein, amino acids, enzymes, organic acids, mineral substances, etc. Honey varies in color from nearly colorless to dark brown. The flavor and aroma of honey vary but are usually derived from its plant origin.

Honey is used as a nutrient food and commonly used also in pharmaceutical. In Ethiopia, honey is widely employed for the preparation of favorite national drink called "tej" and for food in the

form of bread spread or as a sweetener in home baking and medication. The products that this business aims to produce and market primarily are different types of honey including forest honey, Getem(locally) and also unique coffee honey.

Beeswax is one of the most valuable and an oldest bee product to be used by man-kind. It is a complex mixture of hydrocarbons (sugars) and lipids (fats). Beeswax is primarily used for the formation of comb foundation sheet to enhance the development of beekeeping industry. Besides beeswax is used for the production of the candle, locally (t-wife), for the development of new products in various fields such as cosmetics, foods, pharmaceuticals and other industrial applications.

4. Economic Environment

Ethiopian government formulated a five-year growth and transformation plan (GTP) to carry forward the important strategic directions in maintaining the fast-growing economy and the country's economy is projected to grow at an average 11.2 percent annually.

National Honey Industry Strategic Plan developed the plan indicates Ethiopia to be competitive in the domestic and international market of honey, wax and other high-value hive products. Honey production from current approximate 50,000 ton to 200,000 tons and wax from 3,000 tons to 12,000 tons by the end of, 2025.

Consequently, by 2025 honey export will reach about 2400 ton from existing 400 tons, and beeswax export will reach 1000 tons from existing 520 tons. Meanwhile the level of export earnings from USD 210 million in 2015 to reach USD of 4.8 billion in 2025, this shows that the subsector industry has a better contribution to national economy.

Table 1: Estimated Average Honey Production from the three Beehives types in kg

Beehive types	yearly average Production		
	2009/10	2010/2011	2011/12
All type of Beehives (Number)	4,598,226	5,130,322	4,993,815
Total Production (Kilogram)	41524697	53,675,361	39,891,459
Traditional Beehives (Number)	4,447,011	4,944,380	4,772,537
Production (Kg)	38,833,445	51,023,303	36,487,937
Intermediate Beehives (Number)	33,151	41,684	81,596
Production (Kg)	580,891	387,450	475,855
Modern Beehives (Number)	118,064	144,258	139,682
Production (Kg)	2,110,631	2,264,608	2,927,667

Source: CSA, 2011/12

5. Environmental Feasibility

First and foremost, honey production and processing are not only environmentally friendly economic activity; rather it is an agent of environmental rehabilitation through its pollination services.

One day upon a time the world scientist eminent scientist Albert Einstein said that if bees disappear from this world no human being lives long. Honey and wax processing industries were not having more industrial residues like smoky, fluids and chemicals that released to the environment.

6. Technical Feasibility

Honey production has a long history in Ethiopia, and most of the farming communities have developed traditional honey production, harvesting, and extraction techniques. Currently, the transitional and modern system of honey production were designed and practiced in some area of the beekeepers.

More of honey producers experienced marketing of partially pure honey by using locally available materials and currently simple honey extracting equipment introduced by most of the honey producers and collectors.

Improved honey and wax processing machinery are not more sophisticated as other industrial machinery.

7. Market and Product Diversification

7.1 Trade and investment

Combined with the low entry barrier including, start-up capital, the return on investment in honey production appears quite attractive. The combination of honey and wax production leads to the realization of significant profit levels. Afore-mentioned does not even include the value of crop pollination.

Currently, there is about 16 honey and ten beeswax processing and exporter companies actively involved in the business.

By 2015 budget year about 675 tons of honey and 520 weights of beeswax were exported to the foreign market and earned a total of 2.31 and 4.75 American dollars respectively. Other hive products like Royal Jelly, Pollen & bee venom are also in very high demand globally. However, these products have never been appropriated in Ethiopian context (Ayalew & Gezahegn, 1991)

Table2; Exported Honey with Destination Countries and Amount in Tons

No	Countries	Years					
		2003 (2010/11)	2004 (2011/12)	2005 (2012/13)	2006 (2013/14)	2007 (2014/15)	2008 (2015/16)
1	Sudan	375.69	483.5	0.6	258	194.27	109.41
2	Norway	59.72	280.87	6	299.34	184.4	251.32
3	UK	27.6	41.76	0.05	36.42	21.48	70.81
4	Saudi	24.53	17.78	13	8.35	2.88	7.29
5	Germany	20.3	20.3	0	20.88	107.06	68.64
6	Yemen	7.3	10.7	0.25	55.67	37.39	13.92
7	Japan	0.01	0.031	342	1	44.44	14.80
8	Italy	-	-	-	20.88	21.38	-
9	Somalia	-	9.44	0.3	35.44	40.78	-
	Total	515.15	864.381	362.2	735.98	654.08	536.19

Source CSA.2014 and Ethiopian Custom authority and EMDIDI 2016 Annual report

Table3; Exported Beeswax with Destination Countries and Amount in Tons

No	Countries	Years					
		2003 (2010/11)	2004 (2011/12)	2005 (2012/13)	2006 (2013/14)	2007 (2014/15)	2008 (2015/16)
1	Germany	183	165	183	161.5	262.02	55.37
2	Japan	88	68	51	59	121	42.37
3	USA	70	70	88	70.5	105.36	94.87
4	UK	21.5	34.08	63	25.7	32	23.37
5	Italy	-	-	-	-	-	34.32
6	Canada	-	-	-	-	-	17.37
	Total	362.5	337.08	385	316.7	520.38	267.67

Source CSA.2014 and Ethiopian Custom authority and EMDIDI 2016 Annual report

7.2 Potentials of Producing diversified honey bee products

Product differentiation or upgrading is one of the strategies to ensure price competitiveness. There is an enormous potential for diversification of bee products that creates a wider opportunity for the country and exporters to mobilize substantial foreign earning through exporting diversified high-value bee products.

Even though the best known primary products of beekeeping are honey and wax, but pollen, propolis, royal jelly, bee venom, the bee colony and their larvae are also to be regarded as marketable bee products.

The government, development partners, and other concerned actors have to promote beekeeping as a sustainable form of agriculture and develop a commitment to build the technical and material capacity of the subsector industry; this helps to maximize the production and to improve and ensure the quality as well.

8. Demand Projection and Plant Capacity

In related with population growth, urbanization and economic growth of the country there is the increasing demand for table honey consumption in Ethiopia.

Globally, there is a large and growing demand for Ethiopian good quality honey as well as for bees wax and other bee products. Currently Ethiopia entered in EU market in honey and wax, the organic honey has a high demand in developed countries and there will also be the more alternative market outlets.

Ethiopia is a strategic location to international market access and the country is exhaustively working to be the member of world Trade Organization (WTO). There is a market demand for Ethiopian honey and beeswax with the most destination countries of Norway, Germany, Japan, Sudan, UK, Yemen and Somalia for honey and meanwhile German, United States, Japan, United Kingdom, Netherlands, and Italy for beeswax. Particularly there is sustainable demand for beeswax in the international market.

Table 4: Honey and Beeswax Production Projection on GTP II Plan in tons

No	Products	Production Year				
		2008/2016	2009/2017	2010/2018	2011/2019	2012/2020
1	Honey	1030	1288	1338	1398	1667
2	Beeswax	390	400	420	560	580

8.1 Demand Projection for Processed Honey

Demand for processed honey is influenced by population growth, economic growth and income, urbanization and export prospective. Population is growing at a rate of 3% and GDP increased by 11%. Considering the above factor, demand for pressed honey in the domestic market is assumed to grow by 10% per annum.

High quality organic Ethiopian honey and beeswax has a sustainable demand in abroad market and production of other valuable beehive products for export market is an opportunity for the business.

Table 5. Projected Demand of Processed Honey in tons

	Demands	2016	2017	2018	2019	2020	2021
1	Total demand	7481	11103	16698	25350	38738	59468
2	Domestic	965	1003	1043	1085	1128	1173
3	Export	6516	10100	15655	24265	37610	58295

CSA, 2011.

8.2 Plant Capacity

The annual production capacity of the proposed plant in its full capacity is about 300 tons of honey. Production capacity is based on a schedule of 300 working days per annum and three shifts of eight hours per day the project is assumed to start operation on the first year with 70 percent of its full capacity that is 210 tons the full capacity production will be attained in the third year and thereafter.

9. Pricing and Market Regulation

9.1 Pricing and Distribution

The price of honey varies according to its color, purity and season; also vary across the destination countries.

However, for this document, the approximate average unit price of exported honey in 2015 has an average price of 3425-5500 USD/ton based on destination countries. And beeswax average trading price of 9135USD/ton.

Quality honey that produced from improved hives has on the average price of 120-200 birr /kg in the domestic market depends on honey type and season. And the crude honey average price of 60-80 birr in based on location and season.

9.2. Market regulation

The Government has planned to develop honey and beeswax marketing legal framework, and EMDIDI has formed a team with the concerned actors, and the preparation stage has already started. Having national marketing legal framework for honey and beeswax has an opportunity for the processing industries to have sustainable and legally registered suppliers.

10. Incentives and opportunities for the subsector investment

10.1 Incentives

Taxation: The investors who are engaged in this sub-sector are encouraged by different kinds of incentives such as duty-free imports of honey and beeswax processing machinery, equipment, containers, and packaging machines as well. There are special incentives for exporting business like VAT exemption and tax holiday.

Financial loan is also another incentive that the government has planned to avail loan based on 25 percent equity and 75 percent bank loan

10.2 Opportunities in Sub-sector industry

The government and community commitment on mass watershed development along all apiculture potential regions has a great contribution on boosting honey and other bee products. There is a market demand for Ethiopian organic honey and beeswax on abroad market destinations and Ethiopia is already entered in EU market on honey and beeswax as well.

There are potentials to produce diversified products from bee hives among others Propolis, pollen, royal jelly, bee venom and bee colony. Have minimal enter cost in relative to other sub sector industry and it is affordable to invest by middle level investee. Honey and beeswax have

long shelf life this is an advantage and possibility to establish the processing industry in product potential and distance areas from central part of the country.

11. Expected Challenges

Even though there are a wide potentials and opportunities to invest on the sub sector industry there are still some challenges among others limitation of international accredited laboratory service to test quality and safety of honey and beeswax. In order to address these gaps, the government and concerned development partners were working aggressively to establish and functionalize standard laboratories at national level and also at potential regions. Beside there are also private sectors established testing laboratories and still working to capacitate there testing parameters based on international standards.

12. Financial feasibility

The financial requirements regarding investment and running costs of honey and beeswax industry like, beekeeping materials honey and wax purifications machinery are less expensive compared to other livestock investments. Honey production investment is an investment that can run with minimal cost and affordable to many governments and economic agents. There is no need from multiple building and sophisticated high-cost machinery. The government has encouraged investors by availing loan with 25 percent equity and 75 percent. Also the governments provide lease financing for machineries and other processing materials.

13. Infrastructure Facility

The government has intensively working to address the infrastructure facilities of the country like road, electricity, communication service, water particularly in remote areas where there is a vast potential of honey and beeswax production and processing capacities in Integrated Agro Industrial Park (IAIP) have got first priorities to get those infrastructures and utilities export companies are considered.

14. Building and Civil Works

Medium honey processing plant approximately requires a total of 600 m² area of land out of which 300 m² is a built-up area which includes, raw material receiving and storage, Processing, final product storage, loading unloading, office, cafeteria, toilet and washing room, etc.

Assuming construction rate of Birr 3000 per m², the total cost of construction is estimated to be Birr 800,000. The total cost, for 80 years with a cost of Birr 2 per m², is estimated at Birr 600. The total investment cost for land, building and civil works is determined at Birr 801,200.

15. Machinery and Equipment

The machinery and equipment required by the project will be procured from foreign and local sources. The total cost of machinery and equipment is estimated to be Birr 4,000,000.

Table 6. Estimated investment Cost

No	Items	Unit	Quantity	Remark
1	Building and Civil work	birr	4,750,000	Assumed that Machineries and vehicle were imported duty
2	Machinery and Equipment	birr	2,500,000	
3	Land lease value	birr	70,000	
4	Isuzu vehicle	birr	750,000	
5	Wanted working capital	birr	6,875,000	
	Total		14,945,000	

Machinery and Equipment Required for the Plant

For honey processing and packaging	For beeswax processing
<ol style="list-style-type: none"> 1. Liquefier 2. Filter press 3. Falling film Evaporator 4. Storage/settling tank 5. Water circulation pump 6. Pre-heating tank 7. Processing tank 8. Cooling tank/condenser 9. Moisture condensing tank 10. Honey circulation SS gear pump 11. Control panel, Level indicators, 12. pressure gauges, temperature gauges, 13. Packing machines 14. Labeling machine 15. Working tables 	<ol style="list-style-type: none"> 1. Beeswax extractors machine 2. water boiler machine 3. wax cooling containers 4. Packaging 5. Pallet /stands

16. Man power Requirement

The proposed project will require 21 employees of whom 8 are direct production workers and 13 are administrative workers. The annual labor cost of the project is estimated to be 660,000 Birr.

Table.6: List of labor with their salary.

No	Position	Quantity /no	Salary	
			Per month	Per annum
1	General manager	1	5000	60000
2	Personnel	1	3000	36000
3	Secretor	1	2000	24000
4	Purchaser	1	3000	36000
5	Sales man	1	3000	36000
6	Accountant	1	3000	36000
7	Machine operator and maintenance	1	5000	60000
8	Production worker	4	4000	192000
9	Internal quality control	1	4000	48000
10	Guard	3	1000	36000
11	Driver	2	2000	48000
12	Cleaner	4	1000	48000
	Total		36000	660,000
	Benefits (10%)			66,000

17. Materials and Inputs

table. 7 List of materials and inputs for production

No	Items	Unit measure	Quantity	Unit cost in birr	Total cost in birr	Remark
1	Crude honey	kg	250,000	60	15,000,000	25% of it is beewax
2	Sanitary chemicals	kg	-	-	10000	
4	Glass jars	pc	1000	15	15000	
5	Plastic containers	pc	100	300	30000	
6	Drums for bulk honey	pc	200	1000	200000	
7	Lids	pc		-	60000	
8	Cartons	pc		-	30000	
9	Glue				20000	
10	Labels	pc			40000	
11	Total cost				15,405,000	

Utilities

Electric power and water are the two basic utilities required by the plant.

Table 8. Annual estimated utility cost

No	Description	Estimated Cost in birr
1	Electric power	110000
2	Water	4000
3	Furnace oil	25000
Total		139,000

Table 9. Summary of Production cost

No	Items	Cost in birr	Remark
1	Utilities	139,000	
2	Labor /Salary	660,000	
3	Maintenance and repair	80,000	
4	Administration cost	30,000	
5	Overhead cost	25,000	
7	Depreciation	460,000	
	Total	1,394,000	

18. Technological Feasibilities

Even though most of honey producers in the country used traditional local hives currently using transitional and modern hive technology were become increasing. There are companies and organized youth groups that engaged in producing transitional and modern hives.

The trained beekeepers also constructed transitional hives from locally available materials. Honey and wax purification techniques with locally available materials is broadly introduced and used by honey and wax producers, processors and traders as well.

Currently honey and beeswax processing companies are emerging and they import processing machineries and equipment duty free and the technology is introduced in some areas of the country.

18.1 Production Process

Honey contains pollen, dust, bee body parts and air bubbles, which tend to include granulation (crystallization). Heating the honey to 45 C⁰ to dissolve the crystals present in honey can retard the granulation. Filtration then removes part of pollen, foreign particles and wax.

To prevent fermentation and to destroy yeasts, honey is heated to a temperature of 65 C⁰ -70 C⁰ for specified time. Proper temperature control and heating time is a most important factor in honey processing activity.

Excessive heating increases the quantity of Hydroxyl-Methyl-farfel(HMF) which is desirable only at standard level of 20-40gm/kg of honey. High temperature also affects the color and flavor of honey. Honey is then cooled before it is packed to keep it for a longer period without contamination and granulation.

18.2 Honey Processing Steps

- a) Filtration to remove wax, foreign particles after heating honey to 45 C° . It may be noted that heating up to 45 C° (below the melting point of beeswax) is required to decrease the Viscosity of honey.
- b) Honey is then heated to 60 C° - 65 C° for 10 to 15 min and passed in to a falling film Evaporator. Vacuum is simultaneously applied to boil the water in honey at a lower temperature so that moisture is separated which can be collected separately. This procedure also helps in destroying yeasts.
- c) Cooling the honey to atmospheric temperature and storing in closed vessel for 24-48 hrs. is the next step. Storing honey for period of 24-28 hours is necessary to allow air bubbles to go out. Honey is then packed and sealed immediately.

There are honey and beeswax processing machineries and equipment that are imported and used by processors and exporter companies in the country. There is also locally one company is emerging to produce processing machineries (Afesol Engineering plc).

19. Beeswax

From the total 250 tons of raw honey about 30 percent could be raw wax that is 50 tons the average rendering recovery of pure beeswax could be 70 percent. Based on this assumption the company could produce 35 tons of pure beeswax per annum.

During beeswax processing, dark honeycombs should first be soaked in water to remove non-wax components (honey, pollen ...etc.). Otherwise, while melting the wax emulsion is formed in the water reducing wax quality. As wax contains uncombined fatty acids that react the metals of which the equipment is made and change the wax coloring (e.g. iron colors wax in brown, zinc - in dark-blue, copper - in green), that facilitates emulsion formation and deteriorates wax quality. So, it is necessary to use technological equipment produced from non-corrosive materials, enameled metals, aluminum, wood or ceramics. Water mixed with wax is removed by long settling of melted wax.

Recovering wax - larger scale

Centrifuge – honey from the uncapping machine and extractor is pumped through the centrifuge. The wax is then melted and poured into molds. If necessary, you can heat the wax to 70°c and keep it at that temperature for 48 hours. This will allow you to remove any remaining dirt or debris by skimming the top and straining the liquid wax into molds.

The length of settling depends on the degree of wax pollution and its temperature. Beeswax withstands the atmospheric influence and not liable to damage of moth that is common in raw wax materials. It retains its properties, content and quality under long storage and heating.

- The project could be expected to reimburse the gross investment cost by two consecutive production years

By the assumption projected income statement, the project will start generating profit in the first year of operation. Important ratios such as profit to total sales, and return on total investment show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable.

20. Financial Assumptions

- **Selling price**

Honey -----birr 85 per kg

Beeswax-----birr 185 per kg

- **Revenue**

Honey --- 200,000kg x85birr = **birr15, 000,000**

Beeswax ---- 35000kg x185birr = **birr 6,475,000**

Assumed total revenue = birr 21,475,000 on the first year of production

Assumed total production cost = birr 16,830,000

Honey and bees wax loss is assumed to be only by 1% of the total purchased in the first year.

Interest rate of a bank is assumed to be 12 %.

21. FINANCIAL ANALYSIS

Honey Purchase and Sales

Particulars	Year				
	1	2	3	4	5
Purchase Volume					
Honey Purchase in kg	200,000	350,000	460,000	460,000	460,000
Beeswax Purchase in kg	35,000	42,000	48,500	48,500	48,500
Honey Loss	2350	-	-	-	-
Net honey available	232,650	392,000	508,500	508,500	508,500
Sales Volume					
Processed honey	3,229,279	4,620,558	6,150,258	6,150,258	6,150,258
Processed Beeswax	1,415,721	2,650,350	4,684,450	4,684,450	4,684,450
Sales in Birr					
Processed honey	15,	20,500,550	36,480,250	36,480,250	36,480,250
Processed Beeswax	6,475,000	8,910,560	12,560,520	12,560,520	12,560,520
Total Sales	21,475,000	29,411,110	49,040,770	49,040,770	49,040,770
Purchase Cost	4,877,650	7,662,908	11,343,208	11,343,208	11,343,208

Income Statement

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
Cash sales	21,475,000	29,411,110	49,040,770	49,040,770	49,040,770
Costs and Expenses					
Purchase of honey and beeswax	4,877,650	6,682,381	11,159,576	11,159,576	11,159,576
Gross profit	16,597,350	22,728,729	37,881,194	37,881,194	37,881,194
Fixed & operational costs					
Salaries	660,000	986,050	995,460	995,460	995,460
Benefits(incentives)	66,000	98,605	99,546	99,546	99,546
Packaging & other materials	405,000	546,750	710,775	710,775	710,775
Depreciation	460,000	395,560	390,995	390,995	390,995
Promotion and Advertisement	50,000	50,000	50,000	50,000	50,000
Lease/ rent payment	140,000	140,000	140,000	140,000	140,000
Over head cost	135,000	135,000	135,000	135,000	135,000
Interest	1,345,050	1,076,040	807,030	538,020	269,010
Utilities	139,000	250,690	680,070	680,070	680,070
Subtotal operating expenses	3,400,050	3,678,695	4,008,876	3,739,866	3,470,856
Net Income	13,197,300	19,050,034	33,872,318	34,141,328	34,410,338
Provision for Tax	4,619,055	6,667,512	11,855,311	11,949,465	12,043,618
Net Income After Tax	8,578,245	12,382,522	22,017,007	22,191,863	22,366,720

Cash Flow Statement

Particulars	Pre-operating period	Year				
		1	2	3	4	5
Cash in flow						
Own equity	3,736,250					
Loan received	11,298,750					
Cash sales		21,475,000	29,411,110	49,040,770	49,040,770	49,040,770
Total Cash inflow	14,945,000	21,475,000	29,411,110	49,040,770	49,040,770	49,040,770
Cash outflow						
Investment	11,806,250					
Purchase of honey& wax		4,877,650	6,682,381	11,159,576	11,159,576	11,159,576
Packaging& materials		405,000	546,750	710,775	710,775	710,775
Salary		660,000	986,050	995,460	995,460	995,460
Depreciation		460,000	395,560	390,995	390,995	390,995
Overhead cost& other esp.		530,000	674,295	1,104,616	1,104,616	1,104,616
Interest expense		1,345,050	1,076,040	807,030	538,020	269,010
Loan repayment		2,241,750	2,241,750	2,241,750	2,241,750	2,241,750
Total Cash outflow	11,806,250	10,519,450	12,602,826	17,410,202	17,141,192	16,872,182
Net cash flow	3,138,750	10,955,550	16,808,284	31,630,568	31,899,578	32,168,588
Beginning cash balance		3,138,750	14,094,300	30,902,584	62,533,152	94,432,730
Ending Cash Balance		14,094,300	30,902,584	62,533,152	94,432,730	126,601,318

Measure of project worthiness

Net Present Value (NPV) and Benefit ratio (BCR) computation at 12% discount rate

Year	Investment	Gross Cost (oper+prod.cost)	Discount factor	Present Value(birr)	Gross Benefit(birr)	Disco unt factor	Present Value(birr)
0	11,806,250	11,806,250	1.000	11,806,250		1.000	
1		3,400,050	0.893	3,036,245	16,597,350	0.893	14,821,434
2		3,678,695	0.797	2,931,920	22,728,729	0.797	18,114,797
3		4,008,876	0.712	2,854,320	37,881,194	0.712	26,971,410
4		3,739,866	0.636	2,378,555	37,881,194	0.636	24,092,439
5		3,470,856	0.567	1,967,975	37,881,194	0.567	21,478,637
Total		30,104,593		24,975,265	152,969,661	0.734	105,478,717

Net Present Value (NPV)

$$\begin{aligned}\text{NPV} &= \text{Present value of gross benefit} - \text{Present value of gross cost} \\ &= 105,478,717 - 30,104,593 \\ &= \underline{75,374,124}\end{aligned}$$

The net present value is greater than zero. Therefore, this honey and bee wax processing project is accepted.

Benefit- Cost Ratio (BCR)

$$\begin{aligned}\text{BCR} &= \frac{\text{Present Value of gross benefit}}{\text{Present Value of gross cost}} \\ &= \frac{105,478,717}{30,104,593} \\ &= \underline{3.05}\end{aligned}$$

The ratio is greater than one. This means that the project owner will recover the investment and can get good return on its implementation.

Loan Repayment Schedule

Year	Principal Outstanding	Installment due payable	Interest at 12%	Total Payment
1	11,208,750	2,241,750	1,345,050	3,586,800
2	8,967,000	2,241,750	1,076,040	3,317,790
3	6,725,250	2,241,750	807,030	3,048,780
4	4,483,500	2,241,750	538,020	2,779,770
5	2,241,750	2,241,750	269,010	2,510,760
Total	0	11,208,750	4,035,150	15,243,900

22. CONCLUSIONS

As it is known Ethiopia has huge investment potentials for honey processing industry subsector, and the climatic condition is favorable for growing different vegetation and crops which are an excellent source of nectar and pollen that are used as a raw material for beekeeping industries. Mass watershed development along all over the country and organic forest coffee development at the southern and western part of the country have great opportunities to promote honey bee industry and to boost bee hive products.

The financial analysis of this honey processing investment pre-feasibility study shows that the project is worth profitable and acceptable as the discounted measures of the project worth shows positive trend if investors are engaged in the area.

23. References

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